[0132] This application is based on Japanese Patent Application No. 2016-024927 and No. 2016-024928 filed in Japan Patent Office on Feb. 12, 2016, the contents of which are hereby incorporated by reference.

[0133] Although the present invention has been fully described by way of example with reference to the accompanying drawings, it is to be understood that various changes and modifications will be apparent to those skilled in the art. Therefore, unless otherwise such changes and modifications depart from the scope of the present invention hereinafter defined, they should be construed as being included therein.

What is claimed is:

1. An intake air cooling device for an engine with a supercharger, the engine including a cylinder head with a surface in which intake ports are opened, and an intake manifold fixed to the surface of the cylinder head and configured to communicate with the intake ports, the intake air cooling device comprising:

an intercooler which is disposed laterally of the cylinder head and is configured to cool intake air; wherein

the intake manifold includes:

a manifold body fastened to the cylinder head and substantially horizontally extending in a direction orthogonal to a cylinder array direction; and

a cooler forming portion integrally communicating with an upstream end of the manifold body in an intake air flow direction, and constituting a lower end of the intercooler,

when it is assumed that the cooler forming portion is a second cooler forming portion, the intercooler includes a first cooler forming portion to be mounted on an upper portion of the second cooler forming portion, the intercooler being constituted by the first cooler forming portion and the second cooler forming portion, and

the manifold body includes a plurality of fixing portions to be fastened to the surface of the cylinder head, the plurality of fixing portions being located on the outside of the second cooler forming portion when the engine is viewed from a side in a direction orthogonal to the cylinder array direction.

2. The intake air cooling device for an engine according to claim **1**, wherein

the manifold body has a shape extending in the cylinder array direction, and includes the fixing portions at a plurality of positions in the cylinder array direction, and

out of the fixing portions, a fixing portion at a position associated with the second cooler forming portion in the side view of the engine is formed on an upper side than an upper surface of the second cooler forming portion or on a lower side than a lower surface of the second cooler forming portion, whereby the fixing portions are located on the outside of the second cooler forming portion in the side view of the engine.

3. The intake air cooling device for an engine according to claim **1**, wherein

the intercooler is configured in such a manner that a cooling core for circulating a coolant is disposed in the first cooler forming portion, and

the second cooler forming portion includes an upwardly opened recess portion which guides intake air to the manifold body while receiving intake air cooled by the cooling core.

4. The intake air cooling device for an engine according to claim **3**, wherein

when it is assumed that the cooling core is a first cooling core,

the intercooler is configured in such a manner that a second cooling core is disposed in the second cooler forming portion.

5. The intake air cooling device for an engine according to claim **4**, wherein

the second cooling core circulates a coolant whose temperature is lower than a temperature of the coolant circulating in the first cooling core.

6. The intake air cooling device for an engine according to claim **3**, wherein

an inner bottom surface of the recess portion is tilted downwardly toward the manifold body in the direction orthogonal to the cylinder array direction.

7. The intake air cooling device for an engine according to claim **3**, wherein

the engine includes:

a turbocharger which pressurizes intake air by energy of exhaust gas,

a main intake passage which guides intake air pressurized by the turbocharger, and

a branch intake passage which is branched from the main intake passage, is provided with an electric supercharger which pressurizes intake air by a driving force of an electric motor, and guides intake air pressurized by the electric supercharger,

the main intake passage communicates with the first cooler forming portion, and

the branch intake passage communicates with the second cooler forming portion.

8. An intake air cooling device for an engine with a supercharger, the engine including a cylinder head with a surface in which intake ports are opened, an intake manifold fixed to the surface of the cylinder head and configured to communicate with the intake ports, and an intercooler communicating with an upstream end of the intake manifold in an intake air flow direction, wherein

the intake manifold includes a plurality of first fixing portions to be fastened to the surface of the cylinder head, and a plurality of second fixing portions respectively formed at positions closer to the intercooler than the first fixing portions,

the intercooler includes

an intercooler body which cools intake air;

a connecting portion formed at a substantially lower end of a surface of the intercooler body, and communicating with an upstream end of the intake manifold in the intake air flow direction; and

a plurality of third fixing portions respectively formed on the connecting portion at positions opposite to the second fixing portions,

the intake manifold and the intercooler are connected by causing the upstream end of the intake manifold in the intake air flow direction and the connecting portion of the intercooler to abut against each other, and by fastening the second fixing portions and the third fixing portions by bolts and nuts, and

the intercooler body includes a tool insertion through-hole passing in the intercooler body in a direction orthogonal to a cylinder array direction, and allowing insertion of a bolt and nut fastening tool.